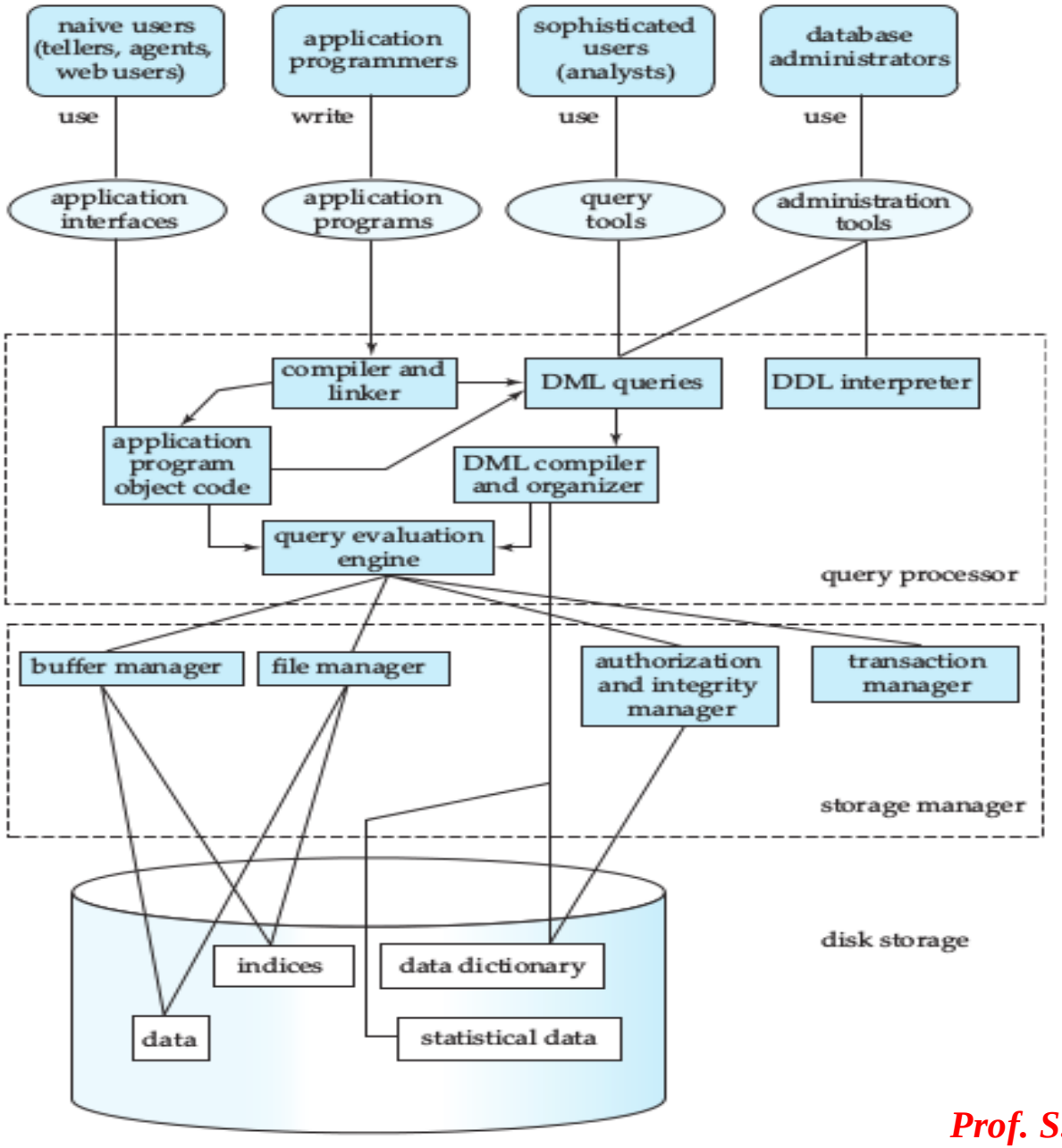
Summary of last lecture

- View of Data – data abstraction
- Instances and Schemas
- Database Language
- Database System Structure - users

Database System Structure



Prof. S. R. Khonde

Functions of DBA

- Schema Definition.
- Storage structure and access method definition.
- Schema and physical organization modification.
- Granting of authorization for data access.
- Routine maintenance.

Data Models

- **Data Model** is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.

- A data model provides a way to describe the design of a database at the **physical, logical, and view levels.**

- Data models define how data is connected to each other and how they are processed and stored inside the system.

Types of Data Models

1) **Record-based Data Models**
   - The Relational Model
   - The Network Model
   - The Hierarchical Model
1) **Object-based Data Models**
   - The E-R Model
   - The Object-Oriented Model
1) **Physical Data Models**

Note: *1st & 2nd model describe data at the conceptual and view levels and 3rd at physical level*

Relational Model

- The Relational model uses a collection of tables to represent both data and the relationships among those data.
- Tables are also known as relations.
- Relation: made up of 2 parts:

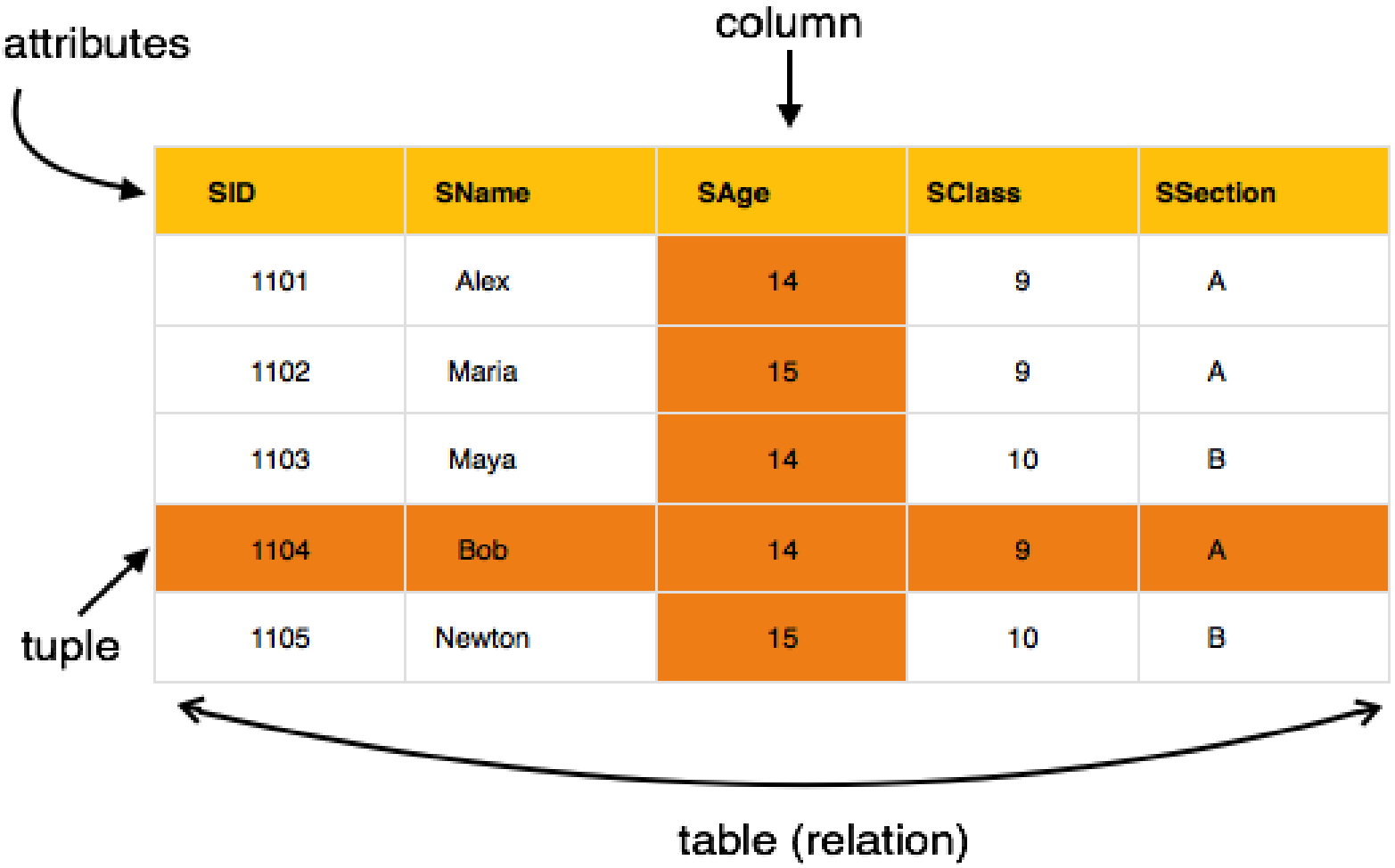
➢ Instance: a table, with rows and columns.

#rows =cardinality , #fields = degree / arity

➢ Schema: specifies name of relation, plus name and type of each column

E.g.: Students(*sid:* string, *name:* string, *login:* string, *age*: integer, *gpa:* real)

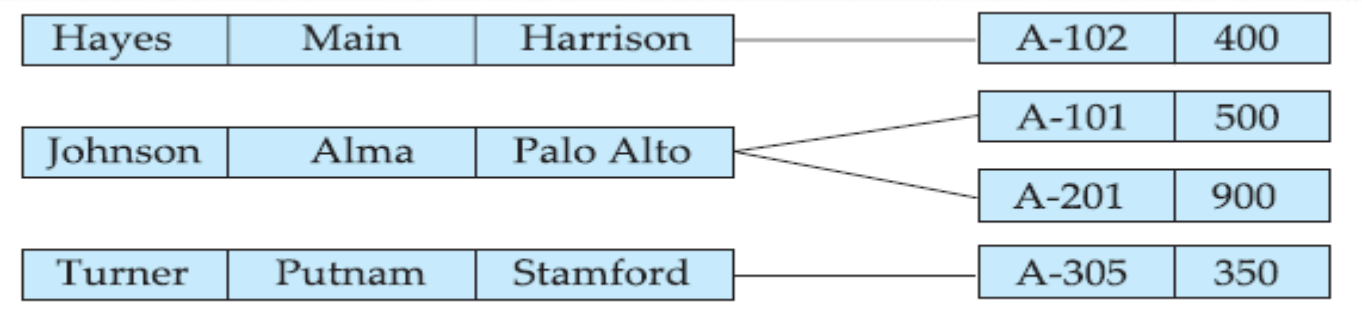
Relational Model Contd…



SID	SName	SAge	SClass	SSection
1101	Alex	14	9	A
1102	Maria	15	9	A
1103	Maya	14	10	B
1104	Bob	14	9	A
1105	Newton	15	10	B

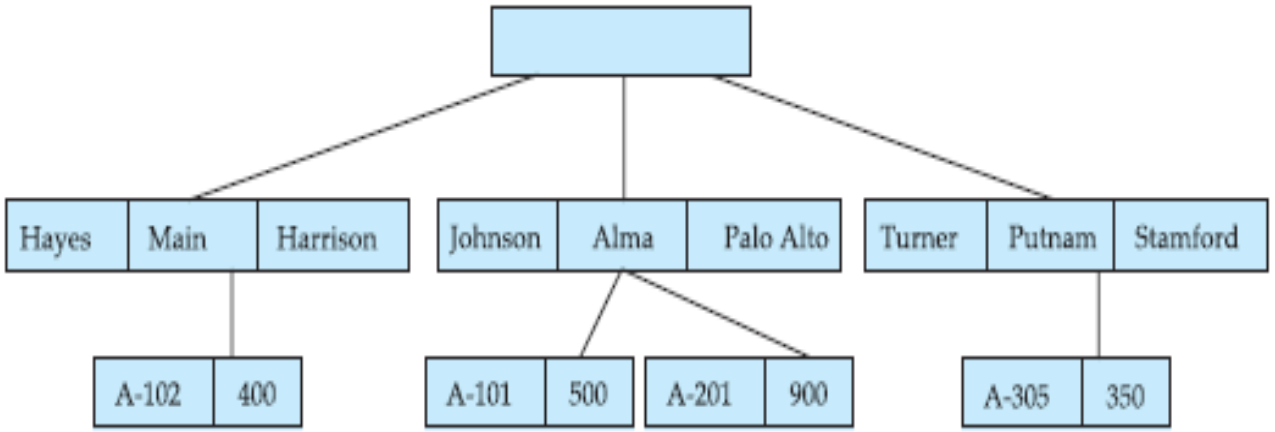
Network Model

- In **Network Model** data are represented by collections of **records**, and relationships among data are represented by **links.**
- Each **record** is a collection of fields (attributes), each of which contains only one data value.
- A **link** is an association between precisely two records



Hierarchical Model

- A **Hierarchical Model** consists of a collection of records that are connected to each other through links.
- A **record** is similar to a record in the network model.
- Each **record** is a collection of fields (attributes), each of which contains only one data value.
- A **link** is an association between precisely two records



Hierarchical Database Model

- The **Hierarchical Model** mandates that each child record has only one parent, whereas each parent record can have one or more child records.

- The relationships formed in the tree-structure diagram must be such that only one-to-many or one-to-one relationships exist between a parent and a child.

- In order to retrieve data from a hierarchical database the whole tree needs to be traversed starting from the root node.